UNITED STATES PATENT AND TRADEMARK OFFICE

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DUKE W. YEE
YEE & ASSOCIATES, P.C.
P.O. BOX 802333
DALLAS, TX 75380

EXAMINER
SAVLA, ARPAN P

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

_____

Ex parte LANE THOMAS HOLLOWAY and
NADEEM MALIK

_____

Appeal 2007-3856
Application 10/713,725
Technology Center 2100

_____

Decided: April 23, 2008

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Before LANCE LEONARD BARRY, JEAN R. HOMERE, and
ST. JOHN COURTENAY III, *Administrative Patent Judges*.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the
Examiner's rejection of claims 1-3, 5-8, 10-13 and 15. Claims 4, 9, and 14
have been cancelled. (App. Br. 4). We have jurisdiction under 35 U.S.C.
§ 6(b). We AFFIRM IN PART. We also enter new grounds of rejection
against claims 11-13 and 15 under the provisions of 37 C.F.R. § 41.50(b).

THE INVENTION

The disclosed invention relates generally to a computer memory. More particularly, Appellants' invention relates to a computer cache for storing frequently accessed lines (Spec. 1).

Independent claims 1 and 11 are illustrative:

1. A cache system for a computer system, comprising:

    a first cache for storing a first plurality of instructions;

    a second cache for storing a second plurality of instructions;

    wherein each instruction of the first plurality has an associated counter, and wherein when a first instruction of the first plurality is accessed, a first associated counter is incremented; and

    wherein when the first associated counter reaches a threshold, the first instruction of the first plurality is copied into the second cache.

11. A computer program product in a computer readable medium, comprising:

    first instructions for checking for a first line of data in a first cache, wherein each line of data in the first cache has an associated counter;

    second instructions for, if the first line of data is found in the first cache, incrementing a first associated counter;

    third instructions for comparing a value of the first associated counter to a threshold;

> fourth instructions for, if the first associated counter exceeds
> the threshold, moving the first line of data from the first cache
> to a second cache.

THE REFERENCES

The Examiner relies upon the following references as evidence in support of the rejections:

Wickeraad   US 2001/0001873 A1   May 24, 2001

Mendelson .   US 2002/0095553 A1   Jul. 18, 2002

Tanenbaum, "Structured Computer Organization" 10-12 (1984).

Jouppi, "Improving Direct-Mapped Cache Performance by the Addition of a Small Fully-Associative Cache and Prefetch Buffers" 364-373 (1990).

THE REJECTIONS

1. Claims 1, 3, 6, and 7 stand rejected under 35 U.S.C. §102(b) as being anticipated by Mendelson.

2. Claims 2 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mendelson in view of Wickeraad.

3. Claims 5 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mendelson in view of Jouppi.

4. Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mendelson in view of Tanenbaum.

5. Claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Mendelson, and Tanenbaum, in view of Wickeraad.

6. Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Mendelson, and Tanenbaum, in view of Jouppi.

PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 102, "[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation." *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1375-76 (Fed. Cir. 2005) (citation omitted).

In rejecting claims under 35 U.S.C. § 103, "[w]hat matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under *§ 103*." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1742 (2007). To be nonobvious, an improvement must be "more than the predictable use of prior art elements according to their established functions." *Id.* at 1740.

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)). Therefore, we look to Appellants' Brief to show error in the proffered prima facie case.

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ANALYSIS

After reviewing the record before us, we address the arguments
presented in the Brief only to the extent that Appellants' arguments are
directed to claimed subject matter. Patentability is based upon the claims.
"It is the claims that measure the invention." *SRI Int'l v. Matsushita Elec.
Corp. of America*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (*en banc*).
"Moreover, limitations are not to be read into the claims from the
specification." *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993)
(citing *In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989)).

Anticipation under 35 U.S.C. § 102
Claims 1 and 3

We note that Appellants Brief does not provide separate arguments for
claim 3. Since Appellants' arguments have treated these claims as a single
group which stand or fall together, we select independent claim 1 as the
representative claim for this rejection. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants contend that Mendelson fails to teach all of the elements
recited in claim 1. Appellants contend that the language of claim 1 requires
that when the first associated counter reaches a threshold, the first
instruction is copied into the second cache. Thus, according to Appellants,
the copying is not discretionary, and is required *when* the first associated
counter reaches the threshold and no other action is required (App. Br. 11,
§ A.1). Appellants further contend that contrary to the present invention,
Mendelson teaches that after a later time, a trace may be, but is not required
to be, evicted from the filter trace cache ("FTC"). If the trace is evicted, the
evicted trace will either be discarded or moved to the main trace cache

("MTC"). The decision as to whether to discard a trace or move it to the MTC will depend on the trace's access counter value. Thus, according to Appellants' interpretation of Mendelson, if the value is below a threshold, the trace is discarded. If the value is equal to or above a threshold, the trace is moved to the MTC (App. Br. 11, § A. 1 ll. 13-18).

In summary, Appellants contend that Mendelson is deficient because according to instant claim 1, the first instruction is copied when the counter reaches a threshold and no other action is involved. In contrast, according to Appellants, Mendelson teaches that traces can stay in the FTC after the counter value reaches a threshold.

Based on the record before us, we do not find Appellants' arguments persuasive. We agree with the Examiner's determination that Mendelson discloses that the FTC contains usage counters which are attached to traces (Ans. 4, lines 7-8), and the traces are moved to the MTC when the counter value reaches the threshold "J." (*Id.* ll. 9-12).

> "If the number of access is equal to or higher than the threshold
> number 'J', the trace is moved to the MTC 330."
(Mendelson para. [0034], ll. 15-16).

Thus, we agree with the Examiner's finding that Mendelson discloses copying the first instruction into the second cache when the first associated counter reaches a threshold.

Appellants further contend that the Examiner disregards the language "<u>when</u> the first associated counter reaches. . ." as recited in claim 1, which should be interpreted as once the counter reaches the threshold, the instruction is instantaneously copied to the second cache. (App. Br. § A.1. 12, ll. 29-31). However, we agree with the Examiner's interpretation that

Appellants' use of the term "when" does not mean "instantaneous." (Ans. 14, ll. 1-6). We conclude the Examiner has reasonably interpreted the term "when" in that the term provides a precondition for copying the instruction into the second cache, which as discussed above, is disclosed by Mendelson.

Appellants further contend that according to claim 1, the copying of the instructions occurs prior to the counter exceeding the threshold. To the contrary, we note that claim 1 recites "when the first associated counter reaches a threshold . . . ." As discussed *supra*, we find Mendelson discloses that the trace is moved if the number of accesses is "equal to or higher than the threshold 'J'." (Mendelson para. [0034], ll. 15-16).

Further, as noted by the Examiner, Appellants' Brief contains arguments that are directed to elements that are not recited in claim 1. For example, Appellants contend that according to claim 1, the first instruction cannot stay in the first cache after its counter reaches a threshold (App. Br. 12). We decline to read these argued limitations into the claims.

Likewise, Appellants' arguments regarding how long the instruction stays in the FTC and the timing of copying the instruction are not recited and cannot be read into the claim. Moreover, Appellants' disclosure and claim language indicate that the instruction may be "copied" into the second cache (thereby leaving the original instruction in the first cache), instead of "moved" into the second cache. (*See* Spec. 11, ll. 4-5).

Therefore, for at least the aforementioned reasons, we conclude Appellants have not shown that the Examiner erred in rejecting claim 1. Accordingly, we sustain the Examiner's rejection of claim 1 (and claim 3 which falls therewith) as being anticipated by Mendelson.

Claims 6 and 7

We consider next the Examiner's rejection of claims 6 and 7 as being anticipated by Mendelson. We note that Appellants' Brief does not provide separate arguments for claim 7. Since Appellants' arguments have treated these claims as a single group which stand or fall together, we select independent claim 6 as the representative claim for this rejection. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants contend that Mendelson fails to teach checking for an instruction in a cache, and then incrementing a counter if the instruction is found in the cache (App. Br. 13, § A.2. ll. 16-17). Appellants further contend that all of the elements of claim 6 are not anticipated because Mendelson teaches that each trace, having an access counter, counts *accesses* to the trace since it was inserted into a particular trace cache (App. Br. 13, § A. 2. ll. 7-10). Appellants further emphasize that finding a trace, as recited in present claim 6, is different than accessing a trace, as taught in Mendelson. Accordingly, Appellants argue that a trace could be found, and never accessed. Thus, according to Appellants, Mendelson fails to disclose all of the elements of claim 6 because the language of claim 6 requires that the counter is incremented when an instruction is *found*, while Mendelson teaches that the counter is incremented when the trace is *accessed* (App. Br. 13-14).

Based on the record before us, we agree with the Examiner's findings that Mendelson discloses all of the features recited in claim 6. More specifically, we agree with the Examiner's reasoning that the action of accessing a trace in a cache anticipates finding a trace in a cache, because

any and all accesses of a trace necessarily require that the trace first be found (Ans. 16-17).

Regarding Appellants' contention that Mendelson fails to disclose *checking* for an instruction in a cache and then incrementing a counter if the instruction is found in the cache, we agree with the Examiner's findings that Mendelson discloses fetching an instruction from the FTC and MTC (Ans. 18, ll. 1-3). We conclude that Appellants have not shown error regarding the Examiner's findings that attempting an instruction fetch in a cache anticipates checking for an instruction in a cache (*see* Ans. 18). Moreover, we agree with the Examiner that Mendelson discloses that if a trace (i.e. instruction) is accessed (and therefore correspondingly found), then the associated counter for that trace is incremented (Mendelson, ¶0031, ll. 11-13).

Therefore, for at least the aforementioned reasons, we conclude that Appellants have not shown the Examiner erred in rejecting claim 6. Accordingly, we sustain the Examiner's rejection of claim 6 (and claim 7 which falls therewith) as being anticipated by Mendelson.

Obviousness under 35 U.S.C. § 103

Claim 2

We consider next the Examiner's rejection of claim 2 as being unpatentable over Mendelson in view of Wickeraad. Appellants contend the second plurality of instructions is stored in the memory cache. Therefore, according to Appellants, the second instruction is already stored in the second cache when it is accessed. At this time, the counters of all of the other second instructions are decremented. Appellants further contend that

Wickeraad teaches that the memory operand is not stored in the cache when it is accessed (App. Br. 14-15).

We disagree, because according to the record before us, Mendelson and Wickeraad disclose all of the recited features of claim 2. More specifically, as previously discussed, we find that Mendelson teaches accessing a stored instruction in the second cache, as follows:

> A trace evicted from the MTC is also either discarded or moved to the L2, based on its access counter. This may be based on its MTC access alone or its combined FTC/MTC accesses.

(*See* Mendelson para. [0040]).

Thus, we find that Mendelson teaches access to traces already stored in the second cache. Further, we agree with the Examiner's findings that Wickeraad discloses decrementing all of the counters associated with the second plurality of instructions when an instruction of the second plurality is accessed (*See* Ans. 6, ll. 1-6).

Based at least on the above, we find that Appellants have not shown the Examiner erred in rejecting claim 2. Accordingly, we sustain the Examiner's rejection of claim 2 as being unpatentable over Mendelson and Wickeraad.

<div align="center">Claim 8</div>

We consider next the Examiner's rejection of claim 8 as being unpatentable over Mendelson in view of Wickeraad. Appellants contend that the cited references, most notably Mendelson, fail to teach *checking* for an instruction in a cache, and then incrementing a counter if the instruction is *found* in a cache (App. Br. 15, B.2. ll. 4-7). Appellants assert that Mendelson instead teaches counting the number of times an actual access of

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a trace occurs. Thus, according to Mendelson, finding the trace does not increase the counter until the trace is accessed. (*Id.*, ll. 5-7).

We disagree because as noted by the Examiner and discussed *supra*, a trace must first be found before it is accessed. Further, Appellants have not shown error in the Examiner's finding that Wickeraad discloses decrementing the remaining counters after an instruction that is stored in the cache is accessed (*See* Ans. 20, ll. 10-16).

Based at least on the above, we conclude that Appellants have not shown error in the Examiner's rejection of claim 8. Accordingly, we sustain the Examiner's rejection of claim 8 as being unpatentable over Mendelson and Wickeraad.

<div align="center">Claim 5</div>

We consider next the Examiner's rejection of claim 5 as being unpatentable over Mendelson, in view of Jouppi. Appellants assert that the combination of Mendelson and Jouppi does not teach the first instruction being copied when the first associated counter reaches a threshold, and the first cache being an instruction cache and the second cache being fully associative, and following a least recently used policy (App. Br. 15-16). Thus, Appellants restate limitations recited in independent claim 1, in addition to merely reciting the limitations of claim 5, which depends upon claim 1. We note that a statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim. *See* 37 C.F.R. § 41.37(c)(1)(vii). We have fully addressed the argued limitations of claim 1 *supra*. Because Appellants have not shown the Examiner erred in rejecting claim 5, we sustain the Examiner's rejection of

claim 5 as being unpatentable over Mendelson and Jouppi for the same reasons discussed *supra* regarding claim 1.

<center>Claim 10</center>

We consider next the Examiner's rejection of claim 10 as being unpatentable over Mendelson, in view of Jouppi. We note that Appellants have not presented any arguments here regarding the secondary Jouppi reference. Nevertheless, Appellants contend that Mendelson fails to teach checking for a first line of data in a cache, and then incrementing a counter if the instruction is found in a cache (App. Br. 16, § C.2. ll. 6-9).

We have fully addressed this argument *supra*. Thus, we conclude that Appellants have not shown the Examiner erred in rejecting claim 10. Accordingly, we sustain the Examiner's rejection of claim 10 as being unpatentable over Mendelson and Jouppi.

<center>NEW GROUNDS OF REJECTION</center>
<center>35 U.S.C. § 101</center>

Using our authority under 37 C.F.R. § 41.50(b), we reject claims 11-13 and 15 under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Regarding claims 11-13 and 15, we note that a computer-readable medium (or media) comprising instructions is directed to statutory subject matter so long as the language of the claims is not supported in the Specification with non-statutory embodiments (i.e., signals, transmission mediums and the like). *See In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007) (A claim directed to computer instructions embodied in a signal is not

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statutory under 35 U.S.C. § 101). *Cf. In re Lowry*, 32 F.3d 1579, 1583-84 (Fed. Cir. 1994) (a claim to a data structure stored on a computer readable medium that increases computer efficiency held statutory).

Here, Appellants' Specification discloses that the claimed computer readable media including a recordable-type and transmission-type media is intended to broadly encompass radio frequency and light wave transmissions (Spec. 16). The cited claims therefore encompass signals and other non tangible transmission mediums. Thus, we conclude that claims 11-13 and 15 are directed to non statutory subject matter.

<div style="text-align:center">35 U.S.C. § 112, second paragraph</div>

Using our authority under 37 C.F.R. § 41.50(b), we reject claims 11-13 and 15 under 35 U.S.C. § 112, second paragraph, as being indefinite.

We begin our analysis by noting that independent claim 11 is presumptively not subject to 35 U.S.C. § 112, sixth paragraph, because it does not contain the term "means." *See CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002). However, this presumption is overcome "if it is shown that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function." *Massachusetts Institute of Technology v. Abacus Software*, 462 F.3d 1344, 1353 (Fed. Cir. 2006) (internal quotation marks and citations omitted).

Here, we consider claim 11 to be subject to 35 U.S.C. § 112, sixth paragraph, because the recited first, second, third, and fourth "instructions for" do not connote sufficiently definite structure. Because we conclude that

claim 11 invokes § 112, sixth paragraph, we consider next whether claim 11 meets the requirements of 35 U.S.C. § 112, second paragraph.

"If there is no structure in the specification corresponding to the means-plus-function limitation in the claims, the claim will be found invalid as indefinite." *Biomedino, LLC v. Waters Technologies Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007). The "clear linkage or association" in the specification of the structure to the function recited in the claim is determined based on the understanding of an artisan of ordinary skill. *See Allvoice Computing PLC. v. Nuance Communications, Inc.*, 504 F.3d 1236, 1242 (Fed. Cir. 2007).

Here, Appellants have mapped the instructions recited in claim 11, to page 12, lines 7-13 of the Specification (*See* App. Br. 7, § G). However, this portion of the Specification is directed to a description of various caches and a counter. While these hardware elements are operated on (i.e., checked or incremented) by the claimed instructions, we nevertheless conclude that the Specification fails to disclose definite structures that an artisan of ordinary skill would correspond to each of the recited first, second, third, and fourth "instructions for" performing a function.[1] Accordingly, we conclude that independent claim 11 is indefinite under 35 U.S.C. § 112, second paragraph.

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[1] Software may be considered structure, or part of a structure, when embodied in a tangible medium. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1210-20 (Fed. Cir. 2003) (claims indefinite because alleged corresponding structure in specification for claimed "means for converting" was a frame grabber, computer video processor, and software routines (not described) for performing the conversion). Here, the scope of the claimed "computer readable medium" broadly encompasses a non-tangible embodiment (i.e., signals), as discussed above.

Because claims 12, 13, and 15 each depend upon independent claim 11, we also conclude that these claims are indefinite under 35 U.S.C. § 112, second paragraph.

<div align="center">Claims 11-13 and 15</div>

Because we conclude that claims 11-13 and 15 are indefinite under 35 U.S.C. § 112, second paragraph, we *pro forma* reverse the Examiner's obviousness rejections of claims 11-13 and 15. The subject matter encompassed by the claims on appeal must be reasonably understood without resort to speculation. Presently, speculation and conjecture must be utilized by us and by the artisan inasmuch as the claims on appeal do not adequately reflect what the disclosed invention is. *See In re Steele*, 305 F.2d 859, 862 (CCPA 1962) (A prior art rejection cannot be sustained if the hypothetical person of ordinary skill in the art would have to make speculative assumptions concerning the meaning of claim language.).

<div align="center">CONCLUSION OF LAW</div>

Based on the findings of facts and analysis above, we conclude that Appellants have not shown the Examiner erred in rejecting claims 1, 3, 6, and 7 under 35 U.S.C. § 102(b) for anticipation and claims 2, 5, 8, and 10 under 35 U.S.C. § 103(a) for obviousness. We *pro forma* reverse the Examiner's obviousness rejections of claims 11-13 and 15 because we conclude that these claims are indefinite under 35 U.S.C. § 112, second paragraph.

DECISION

We affirm the Examiner's decision of rejecting claims 1-3, 5-8, and 10. We reverse the Examiner's rejection of claims 11-13.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)). 37 C.F.R.§ 41.50(b) provides "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review." 37 C.F.R § 41.50(b) also provides that the Appellants, <u>WITHIN TWO MONTHS FROM THE DATE OF THE DECISION</u>, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecuti6on*. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

> (2) *Request rehearing*. Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

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AFFIRMED-IN-PART
37 C.F.R. § 41.50(b)

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rwk

DUKE W. YEE
YEE & ASSOCIATES, P.C.
P.O. BOX 802333
DALLAS TX 75380